

REMARKS/ARGUMENTS

This is in response to the final rejection mailed May 10, 2007.

The claims have been amended to correct errors of a typographical nature. It is respectfully submitted that the claims are now in accordance with 35 USC 112, second paragraph. In this regard, the Examiner refers to claim 80 and the requirement of a heating step. Applicant fails to find heating in claim 80.

Perhaps it might be helpful to review the prior art and particularly Maguire. Maguire notes in the Summary section of the patent:

This invention further provides for a method of producing transparent sintered aluminum oxynitride bodies comprising the steps of preparing a mixture of aluminum oxide and carbon black, reacting the mixture in the presence of nitrogen and a temperature in the range of 1550°-1850°, forming a pressed green body of predetermined shape from said mixture, placing said green body in a sintering chamber, providing doping additions in said chamber, said additives comprising one or more elements from the group of yttrium and lanthanum, or compounds thereof, and sintering said green body at a temperature higher than 1900° C. but lower than the solidus temperature of aluminum oxynitride.

The details of the process described in the Maguire et al patent appear on column 2, beginning at line 36:

... a substantially homogeneous cubic aluminum oxynitride powder by reacting gamma aluminum oxide with carbon in a nitrogen atmosphere. More specifically, aluminum oxide (alumina) and carbon black are dry mixed, for instance, in a Patterson-Kelly twin-shell blender for times up to two hours. Preferably, the aluminum oxide has a purity of at least 99.98% and an average particle size of 0.06 microns, and the carbon black has a purity of no less than 97.6% with 2.4% volatile content and an average particle size of 0.027 microns. The carbon content of the mixture can range from 5.4 to 7.1 weight percent. A preferred mixture comprises 5.6 weight percent carbon black and 94.4 weight percent aluminum oxide. The *aluminum oxide/carbon mixture is placed in an alumina crucible* and is reacted in an atmosphere of flowing nitrogen at temperatures from 1550°C to 1850°C. for up to two hours at the maximum temperature. **The preferred heat treatment is in two steps. In the first step, a temperature of approximately 1550° C. is used for approximately one hour, whereby, for an appropriate ratio of alumina to carbon, the temperature unstable gamma-aluminum oxide is only partially reacted with carbon and nitrogen to form both alpha-aluminum oxide and aluminum nitride. A one hour soak at 1550°C. is**

sufficient to convert the proper amount of Al_2O_3 to AlN . In the second step, a temperature of 1750°C. or up to the solidus temperature of aluminum oxynitride (2140°C.), is used for approximately 40 minutes, whereby alpha-aluminum oxide and aluminum nitride combine to form cubic aluminum oxynitride. (emphasis added)

Considering next the rejection under 35 USC 103, as stated previously, neither Maguire nor AAPA describe nor recognize, and in fact, by teaching that ALON be produced in a two step process (i.e., first aluminum nitride is produced (equation (1), and then the produced aluminum nitride is reacted with a proper amount of alumina to produce ALON (equation (2)), teaches away from, producing aluminum oxynitride by merely introducing aluminum oxide particles and carbon particles into a rotating drum and coming out with aluminum oxynitride.

To this argument the Examiner states:

It is argued that nothing (sic) in the references recognizes that one can eliminate one step of the two step process. The relevance of this argument is not understood - the rejection is not based on eliminating any reaction step. The rejection is based on the mere obvious conversion of a batch process to a continuous one. The rejection results in performing the prior steps simultaneously. It is well understood that reactions (on an atomic level) usually occur in a piecemeal manner - one compound reacts with another to form an intermediate, then the intermediate forms with another compound to form the final (or a further intermediate). In other words, one of ordinary skill would recognize that applicant's invention also inherently requires the two-step process. The reactions occur at substantially at the same time.

It is respectfully submitted that the teaching of the cited prior art teaches a two step process and thus the prior art teaches away from using a continuous process. The Examiner has never explained why one would use a continuous process to produce ALON when the prior art teaches that a two step process should be used and hence teaches away from producing ALON in a continuous process. As stated by the Supreme Court in KSR vs. Teleflex cited by the Examiner:

A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning. See *Graham*, 383 U. S., at 36 (warning against a temptation to read into the prior art the teachings of the invention in issue and instructing courts to guard against slipping into the use of hindsight

(quoting *Monroe Auto Equipment Co. v. Heckethorn Mfg. & Supply Co.*, 332 F. 2d 406, 412 (CA6 1964))). (emphasis added)

In view of the two step teaching to produce ALON, and thus a teaching away from producing ALON in a continuous process, it appears that the Examiner is using hindsight in reaching his conclusion rather than following the teachings of the prior art, i.e. a teaching of a two step process to produce ALON.

That is, using the teaching of the prior art one would use a first drum as Serpek at one temperature to produce AlN and then another drum at a different temperature to produce AlON.

With regard to rejection under 35 USC 112, first paragraph, applicant respectfully disagrees with such rejection. As stated in the patent application:

Retort 30 is then rotated by activating drive motor 40, and reaction mixture 70 is heated. The rotation speed is about 2-50 rotations per minute. The effect of the rotation is to disperse the alumina/carbon particles in the chamber and enable the nitrogen gas to pass around the dispersed particles and thereby facilitate the reaction between the alumina/carbon particles and the nitrogen. Accordingly, the rotation speed should be fast enough to disperse reaction mixture 70 inside retort 30, but not so fast that reaction mixture 70 is centrifuged inside retort 30, thereby preventing the reaction mixture from tumbling. Reaction mixture 70 is heated in the chamber at ramp rate of greater than 10-20 °C/min to a soak temperature of about 1700-1900 °C, **preferably about 1825 °C. The soak time is about 10-30 minutes, preferably about 15 minutes. After reaction mixture 70 has soaked at the predetermined soak temperature and for the predetermined soak time, furnace 20 is turned off, and reaction mixture 70, now AlON powder,** is allowed to cool, typically taking about 4 hours. The cooled AlON powder is removed from retort 30, and another charge of reaction mixture 70 is added to retort 30 to form another batch of AlON. (emphasis added)

Thus, it is respectfully submitted that there is support in the patent application for:

(1) paragraph (b) of claim 58 (i.e. mixing the aluminum oxide particles and carbon particles within the chamber while passing nitrogen gas over the aluminum oxide particles and carbon particles during the mixing with the temperature of the mixing aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles being maintained constant during conversion of the aluminum oxide

particles, carbon particles and nitrogen into the aluminum oxynitride) it being noted that as stated in the patent application the preferred temperature is about 1825 °C;

(2) paragraph (c) in claim 60 (i.e., mixing the aluminum oxide particles and carbon particles while passing nitrogen gas thereover at a temperature sufficient to form the aluminum oxynitride); and

(3) paragraph (b) of claim 76 (i.e., mixing the aluminum oxide particles and carbon particles within the chamber while passing nitrogen gas over the aluminum oxide particles and carbon particles during the mixing with the temperature of the aluminum oxide particles and carbon particles with the nitrogen gas passing over the mixing aluminum oxide particles and carbon particles being maintained sufficient during the conversion of the aluminum oxide particles, carbon particles and nitrogen into the aluminum oxynitride.

In the event any additional fee is required, please charge such amount to Patent and Trademark Office Deposit Account No. 50-3192.

Respectfully submitted,

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Date

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